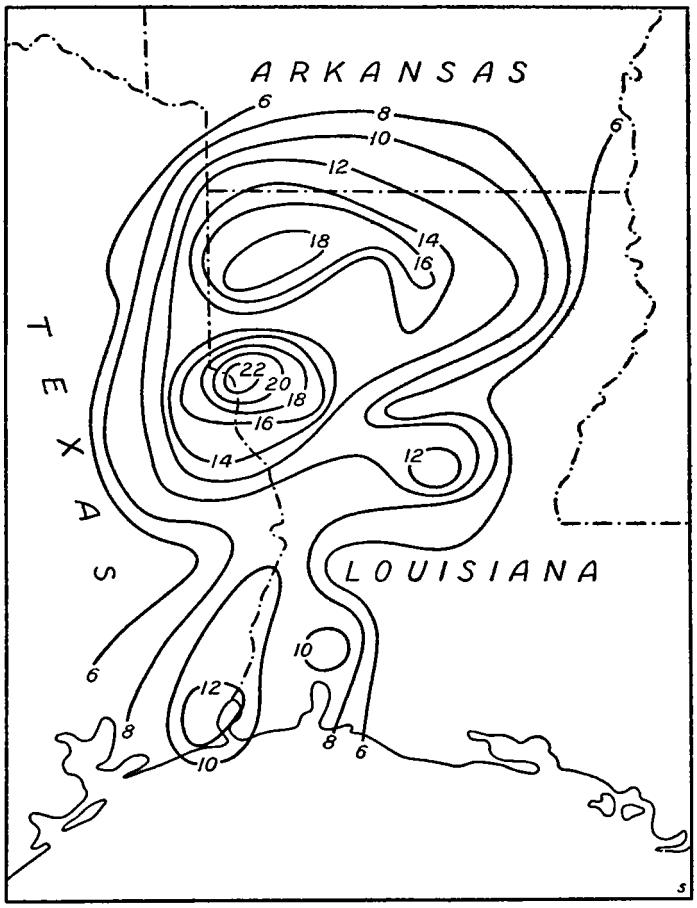
EXCESSIVE RAINFALL OF JULY 22–25, 1933, IN LOUISIANA AND EXTREME EASTERN TEXAS

By R. A. DYKE

[Weather Bureau Office, New Orleans, La., August 1933]

Although of only slight intensity, as indicated by atmospheric pressure and winds, the disturbance which reached the Texas coast late on July 22, 1933, and moved very slowly overland, was attended by a rainfall that seldom has been exceeded in the United States in tropical storms. This disturbance was over extreme eastern Texas and Louisiana on July 22–26, 1933, and moved to Arkansas on the 27th, after which it apparently "filled up" and disappeared.

The 4-day rainfall for extreme eastern Texas and the greater part of Louisiana, on July 22–25, 1933, is charted herewith. Within the 8-inch isohyetal is an area of about 25,000 square miles, with average rainfall of 12.50 inches. There are two principal centers of maximum fall, namely, Shreveport, La., with 19.46 inches and Logansport, La., with 22.30 inches. Considering area-depth-time relations, this ranks close to the most intense of the larger rainstorms that have been recorded in the United States, the dates and circumstances of which were: June 27–July 1, 1899, in east Texas, attending a tropical disturbance of slight intensity, which, however, has little or no previous history concerning its movement, and which was blocked in its northward advance and remained over south Texas until it disappeared; August 17–19, 1915, attending a tropical hurricane, which prolonged heavy rainfall over extreme eastern Texas while recurving slowly from a northwestward to a northeastward course; July 6–10, 1916, in the east Gulf States, attending a tropical hurricane which was greatly retarded in its movement in turning eastward from over Mississippi to Alabama; July 14–16, 1916, in South Carolina and the Southern Appalachian region, attending a tropical hurricane which moved inland across South Carolina from the Atlantic and apparently died out over western North Carolina; and March 12–16, 1929, in southern Alabama, with a trough of low pressure over the Central States. (For charts and descriptions of these rainstorms, see "Storm Rainfall of the Eastern United States, Technical Reports, pt. 5, published by the Miami, Ohio, conservancy district, pp. 146, 169, 176–178, and 196–198; and "Weather Abnormalities in the United States; Excessive Rains and Floods in Southeastern Alabama", by Alfred J. Henry, MONTHLY WEATHER REVIEW, vol. 57, pp. 319–323. The torrential rainfall of September 8–10, 1921, centering at Taylor, Tex., is of smaller area than the rainstorms named above.)



Excessive rainfall (inches) July 22–25, 1933 in Louisiana and adjacent portions of Arkansas and Texas.

Preceding the disturbance as it moved northward the wind circulation was definitely cyclonic along the Louisiana and Texas coasts up to elevations of about 12,000 feet, the winds closely following the coast line. This gave easterly winds over western Louisiana and extreme eastern Texas.

The center of greatest rainfall for the 24 hours ending at 7 a.m., July 23, was over the Sabine River Basin from Port Arthur to Bronson, Tex. During the 24 hours ending at 7 a.m., July 24, the area of maximum rainfall advanced northward to the upper Sabine Basin. Observations at surface and aloft indicate that the southerly winds extended northward during this period and the easterly winds continued over northwestern Louisiana and extreme northeastern Texas. Surface winds and clouds were still from the east over Shreveport during the 24th, with lowest pressure remaining in that vicinity, while the center of greatest rainfall moved eastward to the Red River Valley in northwestern Louisiana for the 24 hours ending at 7 a.m. of the 25th. Over interior sections a broad and deep air current from the northeast prevailed to the northward of Shreveport, while south to southwest winds prevailed along the Gulf Coast. Twenty-four hours later the center of maximum rainfall was over northeastern Louisiana, with precipitation somewhat diminished.

During the period of heavy rains, thunderstorms occurred near the coast but no thunderstorms were reported from interior localities of western Louisiana except at Dodson. All of the facts indicate that southerly winds were meeting and in considerable part ascending over easterly winds in the area of heavy rains during the greater part of the period of excessive precipitation.

The heavy rainfall was not confined to the usual forward region of the cyclone but persisted for 24 hours or more in localities that were some distance to the southward. This is in harmony with Cline's findings regarding tropical cyclones that cease to advance, or suffer pronounced retardation, in which precipitation occurs more generally about the cyclonic center, as contrasted with

advancing tropical cyclones, in which the precipitation is nearly all confined to the forward half.

The foregoing description of conditions is not offered as an adequate explanation of the excessive rainfall. In this, as in many other instances of unusual rainfall, data are insufficient for a satisfactory basis of explanation. From what is known of the precipitation usually attending slight disturbances, the effects seem out of proportion to the apparent preliminary conditions. We may suggest that the angle of inclination of the ascending air in the present instance probably was relatively steep and that condensation aided in intensifying and prolonging the ascent of air, while the continued presence of the disturbance, with its wind circulation, provided the means by which the warm, moist Gulf air was fed into the precipitation machine.

Losses of cotton and other crops in overflowed fields in northern Louisiana, attending and following the heavy rains, amounted to at least a few million dollars. The Red River, which was low when the rain began, had ample channel to pass the runoff, at the rate at which it was received, without reaching bankful stage; but a number of smaller, ungaged streams overflowed.

The following is quoted from a report by Mr. J. W. Cronk, in charge of the Shreveport, La., office of the Weather Bureau:

"The drainage system in this section was so ineffectual that many thousands of acres of land were deeply covered with water for many days, with still a thousand acres or more not free from this water in lower Bossier Parish at the time of making this report, August 10. In Caddo Parish, on the right bank of Red River, where the drainage was inadequate, there were from 10 to 20 thousand acres of farm land more or less badly flooded, and in Bossier Parish, on the left bank of Red River, there were from 50 to 75 thousand acres or more also badly flooded, with some parts of the paved highways covered by water for 2 weeks. Resulting losses in this section, mainly to the nearly matured cotton crop, are estimated as being between one and two million dollars, at a low valuation."

BIBLIOGRAPHY

C. FITZHUGH TALMAN, in charge of Library

RECENT ADDITIONS

The following have been selected from among the titles of books recently received as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies:

International commission for the exploration of the upper air.
Procès-verbaux des séances de la réunion de la Commission internationale pour l'exploration de la haute atmosphère, tenue à Madrid mars 1931. 158 p. figs. plates (part fold.) 24½cm. (Sec. de l'Organ. mét. intern. No. 8.)

International geodetic and geophysical union. Section of meteorology.
Quatrième assemblée générale. Stockholm—août 1930. Procès-verbaux des séances . . . 2. Annexes. Paris. 1933. 170 p. 24½ cm.

International meteorological organization.
IIe rapport de la Commission internationale de l'année polaire 1932–33. Compte-rendu des travaux de la commission pendant sa deuxième année de travail. Procès-verbaux des séances de la réunion à Innsbruck septembre 1931. Leyde. 1932. 188 p. figs. plates (some fold.) 24½ cm. (Sec. de l'Organ. mét. internat. No. 12.)

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Les messages symoptiques du temps. Les messages pour l'aéronautique. Leyde. 1933. 163 p. suppl. 60 p. 24½ cm. Fasc. 4. Édition 1933. (No. 9.)

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Lwów. Université. Institute de géophysique et de météorologie.
Communications. v. 5. Nos. 57 à 66 des résultats des recherches de Henryk Arctowski et de ses collaborateurs . . . faites à la Société des naturalistes polonais et publiées dans la revue "Kosmos." 1930. p. 395–605. figs. plates. 23 cm. [Polish text: French abstract.]

U.S. Agriculture dept. Forest service.
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SOLAR OBSERVATIONS

SOLAR RADIATION MEASUREMENTS DURING JULY 1933

By IRVING F. HAND, Assistant in Solar Radiation Investigations

For a description of instruments employed and their exposures, the reader is referred to the January 1932, REVIEW, page 26.

Table 1 shows that solar radiation intensities averaged above normal at all weather bureau stations at which normal incidence measurements are made.

Table 2 shows a deficiency in the total solar radiation received on a horizontal surface at Madison, Pittsburgh, La Jolla, Gainesville, and Miami, and an excess at all other stations.

Turbidity measurements made on the 6th show that this was an exceptionally clear day for July. Readings obtained on the following day indicate greatly increased turbidity which was the forerunner of a cloudy period that persisted until the 18th.

Polarization measurements obtained at Washington on 4 days give a mean of 57 percent with a maximum of 59 percent on the 19th. At Madison, observations obtained on 8 days give a mean of 64 percent. with a maximum of 72 percent on the 24th. The Washington values are close to the July normals, but the Madison values were slightly above normal.